NOVEMBER/DECEMBER 2023

DCH23/GCH23 — PHYSICAL CHEMISTRY — II

Time : Three hours Maximum : 75 marks

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SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is the importance of first explosion limit?

2. What are consecutive reaction? Give an example.

3. Define mean ionic activity coefficient.

4. According to Debye Huckel limiting law the activity coefficient is always less than one. Justify the statement.

5. Explain IHP and OHP at the electrode — electrolyte interface.

6. Define membrane potential.

7. Assign the point group to the following molecules :

   (a) C_2H_6,

   (b) HCN

8. Define cyclic group and subgroup.

9. Give an example for the non-Abelian group.

10. Compare the selection rules for IR and Raman spectroscopy.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the Rice Herzfeld mechanism for the decomposition of acetaldehyde.

Or

(b) Discuss the kinetics of parallel reactions.

12. (a) What are the limitations of Debye-Huckel limiting Law?

Or

(b) How will you determine activity coefficient by electrochemical method?

13. (a) Write a note on Debye-Huckel-Bronsted equation.

Or

(b) Derive and explain Lippmann equation.

14. (a) What are called reducible and irreducible representations?

Or

(b) Explain the concept of direct product representations.

15. (a) Deduce the character table for C_2v.

Or

(b) How will you determine the normal modes of vibration for water?

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe the relaxation method for studying kinetics of fast reactions.

17. Derive Debye-Huckel limiting law. How it is modified at higher concentration?

18. Write a note on Guoy-Chapman and stern model of electrical double layer.

19. (a) Discuss the Mulliken symbol for irreducible representations. (6)

(b) List the symmetry elements and assign the point group of NH_3 and CO_2. (4)

20. (a) Construct the character table for C_3v point group. (5)

(b) Describe the orthogonality theorem. (5)
